Proposal for Pre-Engineering and Pre-Bioengineering programs at Asia-pacific International University in collaboration with Wall Walla University.

Engineers are the agents of change in almost all aspects of any society. They make it possible for us to communicate, travel, and harness and efficiently use energy supplies. An engineering education from Walla Walla University can be a first step toward this challenging and rewarding career. WWU's Edward F. Cross School of Engineering is recognized as one of the finest in the nation. An ABET accredited program since 1971 offers a baccalaureate degree in engineering with concentrations in Civil, Computer, Electrical, and Mechanical. An interdisciplinary program is also offered with the Department of Biological Sciences in Bioengineering.

By design, the program is highly personal and intensely interactive. Professors will challenge you in rigorous classes; yet provide the support you need to succeed. WWU faculty recognizes engineering as a socially responsible profession. By example, they encourage a commitment to Christian principles in both the personal and professional arena. The Edward F. Cross School of Engineering at Walla Walla University challenges you to revolutionize the way we live. Through life changing experiences, you can concentrate in the areas of Civil, Computer, Electrical, or Mechanical Engineering while obtaining a Bachelor of Science in Engineering degree.

Bioengineering is also offered through an Interdisciplinary Program with the Biology Department. Some Facts about WWU's Engineering Program:-

School of Engineering founded in 1947

- ABET Accredited Engineering program
- 93% placement rate in either engineering employment or graduate school
- Over 1200 graduates to date
- Fundamentals of Engineering Exam taken by all seniors with a better pass rate (90%) than the national average
- Senior Project required to graduate
- Co-ops are available
- Graduates are routinely identified as having higher technical maturity and ethical understanding than their counterparts

The Faculty of Science at AIU is please to be accepted by WWU's school of Engineering to affiliate with them in offering a two- year pre-engineering and a pre-bioengineering degree. This will mean that we will jointly recruit or share in the expense of recruiting and WWU will facilitate in advising and transfer of this students to WWU. This will mean that a student will typically be spending about two years taking classes here at AIU and completing their studies at WWU. Time at WWU will generally be about 2 years. The following pages will show the outline worked out with WWU for such an affiliation.

Outline of WWU-AIU Engineering Affiliation Curriculum

WWU offers a Bachelor of Science in Engineering (BSE) degree with concentrations in civil, computer, electrical, and mechanical engineering, and Bachelor of Science (BS) with a major in bioengineering.

The following two tables list the courses typically taken by engineering students in their first two years at WWU for the BSE. Typical variations for bioengineering majors are outlined after the second table. The corresponding AIU classes are shown in the right-hand column.

First Year

Requirement	WWU Course & Description *	AIU Course & Description
Introduction to Engineering	ENGR 121 INTRO TO THE PROFESSION OF ENGINEERING 2 Introduction to the profession of engineering, computer based engineering calculation tools, analysis of team dynamics, teamwork and engineering communications. ENGR 122 INTRO TO CAD 2 Introduction to Computer Aided Design and Computer Aided Engineering (CAD, CAE). Includes coverage of hand sketching, drafting standards, pictorial representations and principles of descriptive geometry. Covers both 2D and 3D CAD. Discipline specific computer applications will be represented as available. ENGR 121 Recommended. ENGR 123 INTRO TO SYSTEM DESIGN AND ENGINEERING 2 The design process, systems engineering, principles of project management, applied to a full scale project. Emphasis on teamwork, written and oral communication. Prerequisite: ENGR 121 and 122 or permission of instructor.	(Not currently offered.)
English Composition	ENGL 121, 122 COLLEGE WRITING I, II 3, 3 Study and practice in the forms of writing necessary for college. ENGL 121 emphasizes the writing process, a clear writing style, and the basic elements of academic writing, including critical thinking, analysis, and argument. ENGL 122 builds on the concepts introduced in ENGL 121 and teaches students to develop and refine their skills in critical thinking and written argumentation. Students must receive a grade of C- or higher before they can proceed to the next class in the college writing sequence.	ENGL 114 ENGLISH COMPOSITION I 3(3-0-6) The course is an introduction to fundamentals of University writing, focusing on sentence and paragraph constructions, linking and sequencing of ideas, and narrative and descriptive writing. The course includes an application of the principles of English. ENGL 115 ENGLISH COMPOSITION II 3(3-0-6) This course is intended to give students further experience in the writing of expository, persuasive and argumentative essays, as well as

Requirement	WWU Course & Description *	AIU Course & Description
		an introduction of Research Writing Methods.
Mathematics	MATH 117 ACCELERATED PRECALCULUS 5 Introduction to college algebra and trigonometry including equations and inequalities; algebraic, exponential, logarithmic, and trigonometric functions; graphs; and complex numbers. Credit will not be allowed for both MATH 117 and MATH 121 or 122. Prerequisite: Satisfactory departmental placement or MDEV 003. (Precalculus is not applicable to the engineering degree requirements, but is scheduled in the first year if necessary given the students background.) MATH 181 ANALYTIC GEOMETRY AND CALCULUS I 4 Study of functions, limits, continuity, derivatives, definite integrals, and the Fundamental Theorem of Calculus. Credit will not be allowed for both MATH 123 and MATH 181. Prerequisite: MATH 117 or 122 or satisfactory departmental placement. A graphing calculator is required. MATH 281 ANALYTIC GEOMETRY AND CALCULUS II 4 Study of indefinite integrals, calculus of inverse functions, and techniques and applications of integration. Prerequisite: MATH 181. A graphing calculator is required.	MATH 140 PRECALCULUS 3(3-0-6) Pre-calculus blends the concepts and skills that must be mastered before enrollment in a University level calculus course. It includes the study of polynomial, rational exponential, and logarithmic functions. Emphasis will be given to the modeling and analysis of real-life scenarios in the areas of business and the life sciences. (Only one semester of calculus is currently offered, MATH 241. Its course description suggests that it may cover what would be expected in the first semester of a three-semester calculus sequence; but this would have to be evaluated. The remainder of the calculus sequence will need to be added.) MATH 241 CALCULUS FOR LIFE AND SOCIAL SCIENCES 3(3-0-6) Introduces basic concepts of differential and integral calculus for students majoring in life and social science. Includes elementary differential and integral of polynomial, logarithmic and exponential functions. The development and analysis of real life mathematical models in the life and social sciences will be emphasized. Prerequisite: MATH 140 or permission of the instructor.
Chemistry	CHEM 141, 142, 143 General Chemistry 3, 3, 3 Study of the structure and states of matter; atomic and molecular theory, including valency, periodicity, and bonding; solutions and equilibria, stoichiometry, kinetics, and thermodynamics; and the descriptive chemistry of metals and nonmetals. Must be taken in sequence. Prerequisites or corequisites: MATH 121, 122 or equivalent; CHEM 144, 145, 146. CHEM 144, 145, 146 General Chemistry Laboratory 1, 1, 1 Laboratory integrated with CHEM 141, 142, 143. One laboratory per week. Corequisite: CHEM 141, 142, 143.	CHEM 151 GENERAL CHEMISTRY I 4(3-3-6) Introduction to the fundamental laws and accepted theories of chemistry. Topics will include atomic and molecular structure and bonding, chemical reactions and stoichiometry. One laboratory per week. CHEM 152 GENERAL CHEMISTRY II 4(3-3-6) Introduction to the fundamental laws and accepted theories of chemistry. Topics will include acids and bases, kinetics, equilibrium, electrochemistry, thermodynamics, and nuclear chemistry. One laboratory per week. Prerequisite: CHEM 151.
Computer Science	CPTR 141 INTRODUCTION TO PROGRAMMING 4 Programming-in-the-small, introducing computer science principles and software engineering concepts for designing, coding,	CIS 210 ESSENTIALS OF COMPUTER PROGRAMMING 3 (3-2-6) This is an introductory course in computing which explores the fundamental concepts of

Requirement	WWU Course & Description *	AIU Course & Description
	executing, and debugging within the C family of programming languages. Laboratory work required.	computer programming emphasizing general programming concepts variables, constants, functions, procedures with a major focus on object-oriented methodologies. The course focuses on an object-oriented programming language, with special attention given to problem solving techniques, program design, style, verification, and algorithm development. Laboratory work is required. Prerequisite: CIS 104 or EQUIVALENT
Computer Science	CPTR 142, 143 DATA STRUCTURES, ALGORITHMS AND OBJECTS 4, 4 Topics include lists, stacks, queues, trees, graphs, searching, sorting, and hashing using concepts of object-oriented programming, space-time efficiency, and software engineering. Team projects and laboratory work required. Prerequisite: CPTR 141. [Required only for EE and CpE.]	(No equivalent is currently offered.)
Religion	General studies religion courses.	General studies religion courses.
Physical Education	PE activity classes, no more than 3 credits.	(Not found.)

* Note: WWU's regular school year is divided into three quarters, rather than two semesters.

Second Year

Requirement	WWU Course & Description *	AIU Course & Description
Engineering Mechanics	ENGR 221, 222, 223 ENGINEERING MECHANICS 3, 3, 3 Introduction to two- and three-dimensional equilibria employing vector algebra; friction; centroids and centers of mass, virtual work, and moments of inertia. One- and two-dimensional kinetics and kinematics of rigid bodies by vector calculus; dynamics of rotation, translation, and plane motion; relative motion; work and energy; impulse and momentum. Must be taken in sequence. Corequisite for 221: MATH 282; Corequisite for 222: MATH 283.	(Not currently offered.)
Mathematics	MATH 282 ANALYTIC GEOMETRY AND CALCULUS III 4 Study of sequences, series, polar coordinates, parametric equations, and vectors. Prerequisite: MATH 281. A graphing calculator is required. MATH 283 ANALYTIC GEOMETRY AND CALCULUS IV 4 Study of differential and integral calculus of multi-variable functions, line and surface	(Only one semester of calculus is currently offered, MATH 241. The remainder of the calculus sequence will need to be added.)

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	integrals, Green's theorem, divergence theorem, and Stokes' theorem. Prerequisite: MATH 282.	
Mathematics	One additional course, either: MATH 289 LINEAR ALGEBRA AND ITS APPLICATIONS 3 Study of matrices and determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, with applications. Prerequisite: MATH 123 or 181. MATH 312 ORDINARY DIFFERENTIAL EQUATIONS 4 Study of solutions of first order differential equations, solutions of linear differential equations of order n, applications, linear systems, and series solutions. Prerequisite: MATH 283.	(Not currently offered.)
Physics	PHYS 251, 252, 253 PRINCIPLES OF PHYSICS* 3, 3, 3 Introduction to mechanics, relativity, thermodynamics, electromagnetism, wave motion, and optics; designed to provide the science and engineering major with an intuitive and a mathematical understanding of fundamental physical concepts. Must be taken in sequence. Prerequisites: MATH 181, 281. Corequisites: PHYS 254, 255, 256; MATH 282, 283. PHYS 254, 255, 256 PRINCIPLES OF PHYSICS LABORATORY 1, 1, 1 Experimental exploration and study of the fundamental concepts of physics integrated with PHYS 251, 252, 253.	PHYS 251 GENERAL PHYSICS I 4 (3-3-6) Study of kinematic and dynamic motion of particles in linear and rotational motion, force, work, momentum, energy and properties of matter. One laboratory per week. Prerequisite: MATH 140 or equivalent. PHYS 252 GENERAL PHYSICS II 4 (3-3-6) Study of thermodynamics, wave properties, electric and magnetic forces, optics, relativity and an introduction to quantum and nuclear physics. One laboratory per week. Prerequisite: PHYS 251. (Note, however, that AIU's PHYS 251 and 252 are not calculus based. One way to remedy this is for AIU to offer an additional "Calculus Applications" course as a companion to PHYS 252. Another way is for the student to take one of PHYS 251, 252, or 253 upon arrival at WWU.)
Circuits	ENGR 228 CIRCUIT ANALYSIS 4 Study of circuit variables and parameters; Kirchoff's laws and network solution; equivalent circuits, network theorems; natural and complete response; sinusoidal steady-state, phasors, and impedance; frequency characteristics; power and power factor. Laboratory work required. Prerequisite: MATH 282. PHYS 252 strongly recommended.	(Not currently offered.)

Requirement	WWU Course & Description *	AIU Course & Description
General Studies	To fill in, up to a total load of 18 credits each quarter. See Guidelines for Planning Engineering Programs.	To fill in, up to a full load. Choose courses that would transfer to WWU courses listed in Guidelines for Planning Engineering Programs.

* Note: WWU's regular school year is divided into three quarters, rather than two semesters.

Bioengineering

Students majoring in bioengineering typically have plans similar to the above, but with the following changes owing to different requirements:

- Since Introduction to engineering is not required, this sequence may be omitted.
- Since a full year of General Biology is required (WWU BIOL 141, 142, 143; corresponding to AIU BIOL 151, 152, 153), this is added to the first year, and Chemistry and Physics may be move a year out.

Transferring to WWU

A students transferring to WWU after completing all of the courses listed in the two tables under WWU Course & Description could expect to complete the remaining requirements for a BSE or BS in two years at WWU. If a student transferred to WWU lacking either Engineering Mechanics, Physics, or the second-year mathematics requirements, that student may require three years to complete the degree requirements.

Admission Requirements

WWU's admission policy for international students is outlined in the undergraduate bulletin (http://www.wallawalla.edu/academics/bulletins/undergrad/current/), in the chapter "Admission to the University," under the heading "Admission Requirements and Procedures for International Students." There are no additional requirements for engineering students.